6 Philosophy vol 3.

ASTRONOMIC DOUBTS:

OR, AN

ENQUIRY

INTO THE NATURE OF THAT

SUPPLY of LIGHT and HEAT,

WHICH THE

SUPERIOR PLANETS

MAY BE SUPPOSED TO ENJOY.

By PHILIP PARSONS, B. A. K

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> Largior hic campos Æther, et lumine veſtit
> Purpureo, Solemque ſuum, ſua Sidera norunt.
>
> VIRG. Æneid vi.

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G III.

ASTRONOMIC DOUBTS, &c.

SECTION I.

In which it is endeavoured to be proved, that the ſuperior planets do not receive their light and heat from the ſun.

IT is a received point in aſtronomy, that all the planets are in themſelves dark bodies, like this our earth, and that they derive their luſtre from the ſun, the common centre of the ſyſtem, and the original fountain of light and heat. I can very readily ſubſcribe to the opinion, that they are all of them dark bodies, but philoſophy, which is not dictatorial, will excuſe me, if I doubt whether they all receive their light and heat from the ſun. Further conviction than I have hitherto received, is, I confeſs, neceſſary to induce me to change my opinion; but at preſent I humbly conceive, that the ſupply of light and heat from the ſun to the ſuperior planets is inadequate to the purpoſes of life and vegetation, and, indeed, in the very remote planet Saturn, inadequate to any purpoſes at all.

Before I proceed further it may be neceſſary to obſerve, that all our reaſonings on this point muſt be from analogy. We muſt argue from *the things that are ſeen, to the things that are not ſeen*. From our knowledge that this planet which we inhabit is in itſelf dark, cold, and barren, and that it requires a ſupply of light, heat, and genial nouriſhment, which it actually receives from the ſun, to render it a ſeat accommodated to the ſubſiſtence of its inhabitants, we are led to conclude, that the other planets are of the ſame nature, and conſequently require a ſupply from the ſun the ſame in nature (though perhaps different in degree) as that which we know we require, and are ſure that we receive. Experience in the caſe of the other planets is out of the queſtion, unleſs we could pay them a viſit by the help of Biſhop Wilkins's machines, and ſatisfy our doubts by the demonſtration of our ſenſes. But as this cannot be, I think, if we would argue reaſonably upon a ſubject like this, our arguments muſt be drawn from analogy. It is a mighty eaſy matter, and perhaps not unentertaining, to indulge imaginary ſpeculations, and ſuppoſe, as certain ingenious writers have done, that the inhabitants of Venus have vitrified bodies, and that thoſe of Saturn are caſed in marble, the one to endure the heat, and the other to fence againſt the cold; and when once we have given the reins to the creative faculty of imagination, it may as well be allowed to proceed, and provide the inhabitants of Venus and Saturn with eyes, formed in a peculiar manner, ſuited to their reſpective quantities of light, by contracting the pupils of the one to the narrowneſs of a hair, and enlarging thoſe of the other to a circle of no moderate ſize. Speculations of this ſort are amuſing, but they reſt upon no foundation. I do not ſay that our great Creator has not formed theſe things after this manner, but who told you that he has? Certainly Reaſon was not the inſtructor, but airy imagination; which delights to argue, not from what we do know, but from what we do not know, excluding all ſolid proofs ariſing from the objects with which we are acquainted, in order to frame cobweb ſpeculations from things to which we are utter ſtrangers.

Thus much being premiſed, and I preſume allowed, let us proceed to conſider the probability of *all* the planets receiving *ſufficient* light and heat from the ſun; ſufficient for the purpoſes of life and vegetation.

The different diſtances of the different planets from their central ſun are allowed by philoſophers, to be nearly as follow:

Mercury,	*thirty-two millions of miles,*
Venus,	*fifty-nine millions.*
Earth,	*ninety millions.*
Mars,	*a hundred and twenty-three millions.*
Jupiter,	*four hundred aud twenty-four millions.*
Saturn,	*ſeven hundred and ſeventy millions.*

In ſuch immenſe diſtances as theſe, exact calculation is not to be expected, nor, indeed, is it neceſſary to my purpoſe. If

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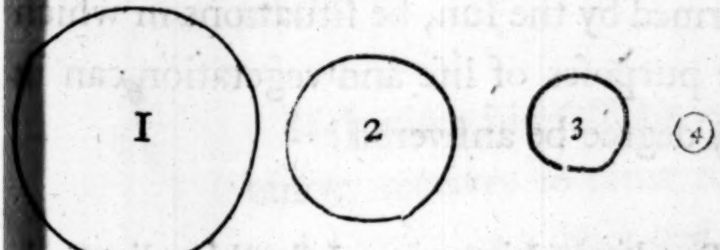
any ſcrupulous mathematician, therefore, ſhould think proper to ſtand forth and prove any of the above diſtances erroneous, I ſhall not diſpute the matter with him; like good-natured *Sterne*, with his mule, "I never will argue a point with "one of that family as long as I live;" but ſhall readily give him up a million or two of miles, which, great as the diſtance may ſeem, are yet but an imperceptible point in the grand extent that is before us.

But allowing the diſtances to be tolerably right, then to an inhabitant of the different planets the ſun muſt appear in the following proportions.

To Mercury, *three times as big as to us.*
To Venus, *not quite twice as big.*
To Mars, *about one-third leſs.*
To Jupiter, *not quite five times leſs.*
To Saturn, *more than ſeven times leſs.*

If theſe proportions be made with to-rable exactneſs, how very ſmall muſt be he appearance of the ſun to Jupiter, (not o ſay a word of Mars) but how exceedngly diminutive muſt this ſame central lobe appear to an inhabitant of Saturn.

Allowing the circle below marked (1) to exhibit nearly the ſize of the ſun's diſk to this earth, as I believe it does, then, according to the above proportions, the circles (2) (3) (4) will very nearly give us the ſize of his diſk to the planets Mars, Jupiter, and Saturn.



According to theſe appearances Mars perhaps may fare tolerably well for light and heat, but the inhabitants of Jupite muſt ſee a mere feeble twilight, and feel ſevere Siberian cold; while thoſe of Saturn muſt be content with a light barel equal to that of a froſty winter's night and as to warmth, the frozen region which Captain Phipps lately viſited, enjoy a perfect ſummer when compare with that cold which Saturn muſt eve feel.

Reaſoning now from analogy, let m aſk, whether planets, thus faintly enlightened, and thus feebly, or (if I ma be allowed the expreſſion) thus coldl warmed by the ſun, be ſituations in whic the purpoſes of life and vegetation can i any degree be anſwered?

But here, I imagine, I ſhall be directe with an air of triumph, to look at th grand retinue of Jupiter, and the ſti grander apparatus of Saturn; to behol

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the four moons of the one, and the ſplendid ring, with the five moons, of the other, and then conſider whether thoſe noble attendants were not placed there to receive from the ſun, and to reflect, upon their reſpective planet, both light and heat; and whether they do not ſeem, by the light and heat which they receive and return, to compenſate for that loſs of both, occaſioned by the diſtance of Jupiter and Saturn from their genial centre.

Now I allow that this thought is natural, and carries with it a plauſible appearance; but let us conſider it with attention.

If Jupiter himſelf, by reaſon of his diſtance, receives ſo faint a light and heat as I have above deſcribed, it is plain that his moons can receive no more than he does, and they can reflect no more than they receive; nay, not ſo much, for a great deal of it will be imbibed by them, and never reflected upon the planet: and whether the ſmall light which they receive, and the ſtill leſs that they reflect, can anſwer the end propoſed, may be readily left to the reader's judgment.

It may be urged, that the moons in their revolutions are frequently nearer the ſun by much than the planet, and by conſequence receive more light and heat than he does: I grant it; but it happens unfortunately, that when they are nearer the ſun, they then reflect their light back *to* the ſun, and *from* the planet, towards which their dark and cold hemiſphere at thoſe times is turned. When the moons reflect the fulleſt light upon Jupiter, it is in that part of their circle when they are faртheſt from the ſun, when they receive, (and by conſequence return) their leaſt ſhare of light and heat from him.

If this be the caſe with Jupiter, what will we ſay to Saturn? whoſe immenſe diſtance from the centre ſubjects him to greater wants of light and heat; whoſe five moons, like Jupiter's four, can reflect upon him only that little, or leſs than that little, which they receive, and whoſe ring, (to the ſplendor of which we are directed to apply to make up other deficiencies) though it certainly, by reflection, affords the planet ſome returns of light and heat, does yet, on another account, ſo far prejudice that globe which it ſurrounds, as to deſtroy by one way that very light and heat which it is ſuppoſed ſo liberally to beſtow upon it by another.

Aſtronomers need not be told that there are certain * poſitions and certain ſeaſons in the planet Saturn, in which the ring

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* I have purpoſely avoided all aſtronomical terms, as I look upon them as a mere affectation; and when they are not abſolutely neceſſary, and any others will expreſs our meaning

that ſurrounds it, will inſtantaneouſly and totally eclipſe the ſun at noon day, and this not rarely, but daily; and what is ſtill worſe, the duration of this total privation of light and heat, though at firſt momentary, will encreaſe every day for a long (and what to our imagination muſt appear) a tedious time. Ill-fated planet! to receive but a weak and ſcanty ſupply of light and heat from the ſun, and yet to be thus daily precluded from that ſcanty ſupply.——

> *Nil habuit Codrus: quis enim negat? et tamen illud*
> *Perdidit infelix totum nil.*

Thus we ſee, that Saturn appears not only to be left more forlorn of light and

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meaning as well, to introduce them then, is to make an inſufferable and inſignificant parade of learning. With the uſe of ſuch terms none but learned men could underſtand me; without them every-body may; and I would wiſh (with the immortal Addiſon) "to bring Science "from cloſets and libraries, ſchools, and colleges, to "dwell in clubs and aſſemblies, at tea-table and coffee-"houſes," heat than Jupiter, by reaſon of his greater diſtance, but to be not unfrequently robbed of both by his ring, whoſe ſize and ſituation naturally produce this moſt uncomfortable effect.

I have tranſiently touched upon the planet Mars, and granted that he may fare tolerably well: yet I muſt obſerve, that the ſupply which the ſun affords him can be but feeble and faint; greater indeed by much than the planets which are ſuperior to him, but yet by far leſs than that which we on earth enjoy. In a word, the influence of the ſun upon Mars can only be ſuch as to render him merely habitable; but as for Jupiter and Saturn, his appearance is ſo ſmall to both, and his power ſo very weak, that if from his action they receive their only nouriſhment, the ſtate of the one muſt be indeed very dark, cold, and barren, but for the other, no words can deſcribe its condition.

Nature ſtarts back at the thoughts of ſuch a ſcene of dreary, dark, barren, and icy deſolation!

SECTION II.

In which is endeavoured to be ſhewn from whence the ſuperior planets do receive their light and heat.

IF it could be thought that any thing which I have ſaid in the fore-going ſection might be ſuppoſed, in any degree, to arraign the wiſdom of the creator in the formation of theſe diſtant worlds, I would inſtantly retract, and eraſe, with contempt, the offending paſſage: but I am happily conſcious that nothing of this kind can with juſtice be ſuppoſed; for I undertook this little treatiſe with a very different view, with a deſign to point out the weakneſs of the human mind, which could reſt ſatisfied with ſo inadequate a ſupply of thoſe eſſential bleſſings light and heat, as the ſun could afford to the ſuperior planets; and, at the ſame time, to point out a much more noble and ſufficient ſource whence both might be drawn; and thus, as far as in my ſmall power, make an humble, yet commendable attempt

To juſtify the works of God to Man.

I apprehend then, that though the ſun may with juſtice be ſuppoſed the centre round which all the planets roll, yet ſince, by reaſon of its diſtance (as I have ſhewn) it can but faintly and ineffectually give them light and heat; they receive a glorious and inexhauſted ſupply of both from the FIXT STARS, a ſupply ſufficient to render them ſcenes of infinite beauty, uſe, and grandeur, and far ſuperior (if my opinion fail me not) to this earth which we inhabit.

It is but juſtice due to that ingenious traveller, Mr. Brydone, to confeſs, before I proceed any farther, what gave birth to this thought, for I claim no other merit than to have improved a hint, and to have built upon the foundation which that gentleman (though perhaps without any view to the ſuperſtructure raiſed upon it) laid in the following paſſage of his entertaining *Tour through Sicily and Malta*: "When near the top of Ætna," ſays he, "the ſky was perfectly clear, and the "immenſe vault of the heavens appeared "in awful majeſty and ſplendor. We "found that it ſtruck us more forcibly "than below, and at firſt were at a loſs "to know the cauſe, till we obſerved, "with aſtoniſhment, the *number of the ſtars* "*ſeemed to be infinitely increaſed*, and that "the light of each of them appeared

" *brighter than uſual.* The whiteneſs of
" the milky way was like a pure flame
" which ſhot acroſs the heavens, and
" with the naked eye we could obſerve
" cluſters of ſtars that were *totally invifible*
" *in the regions below.*" Vol. I. p. 185.

I had no ſooner read this animated paſſage which ſo beautifully deſcribes this ſcene, than I was ſtruck, not only with the grand object immediately before me, but with the ſplendid and ſtill more ſplendid glories that continually increaſed around me, as I extended the view of the *mind's eye,* and carried the ſame reflections through the unlimited regions of ſpace.

For let us conſider: If an elevation of leſs than two miles could make ſo conſiderable a difference in the appearance of the heavens, as that *the number of the ſtars ſeemed to be infinitely increaſed,* that *all ap-*

peared brighter than uſual, and that *the naked eye could obſerve cluſters of ſtars totally inviſible in the regions below*, what an increaſe of brightneſs muſt every moment break upon us, upon an approach towards the ſtarry regions twice as near, ten times, or ten thouſand times as near, till we arrive at the planet Mars. There let us pauſe a while, and reflect a moment, on the difference of ſplendor, which muſt be occaſioned by a nearer approach of forty-three millions of miles. The view is delightful, and aſtoniſhingly grand; but if it be thus in Mars, what ſhall we obſerve in Jupiter? what in Saturn? where one is nearer to thoſe great fountains of beauty, light, and heat, the FIXED STARS, than we are, by three hundred and thirty-four, and the other by ſix hundred and eighty millions of miles? If in Mars the ſcene be bright and beautiful, in Jupiter it muſt exhibit a ſplendor moſt magnificently grand, ſparkling from innumerable fires; but on Saturn, the FIXED STARS muſt ſhed one exhauſtleſs unremitted blaze of living luſtre, that beggars all deſcription. And are theſe, are theſe the regions which we have hitherto rejected and deſpiſed? which we have anathematized, and diſcarded, as barren outcaſts from the niggard hand of nature, forlorn, frozen, dark, and deſolate? widely different do they now appear; ſcenes of luxuriant beauty, adapted to the purpoſes of life and beatitude, and worthy of that almighty hand which formed them ſo wonderfully, and placed them ſo happily; ſcenes that

In Reaſon's ear may now rejoice,
And utter forth a glorious voice;
For ever ſinging, as they ſhine,
The hand that made us is divine.

But in order to give the greater force to this pleaſing conjecture, it may be worth while to conſider how ſtrongly the different ſituation of the different planets urge it to our reaſon.

The inferior planets, from their vicinity to the ſun, neither want nor receive any benefit from the fixed ſtars; the ſuperior planets, by reaſon of their diſtance from the ſun, both want and receive the greateſt advantages from them; advantages which ariſe moſt remarkably in order and degree; for let us mark the beautiful gradation from Mercury the neareſt, to Saturn the fartheſt, from the ſun.

Mercury then, as he enjoys a very great degree of luſtre from the ſun, in all probability ſees none of the fixed ſtars, nor perhaps any of the ſuperior planets. The earth, indeed, and Venus, will appear to him moſt beautifully bright, and may ſerve as moons (for he ſeems to have none of his own) to diſpel the darkneſs of night.

As we advance to Venus, ſtars perhaps of the firſt magnitude may make their faint appearance; but here, as with Mercury, the light of the ſun is ſo ſtrongly reſplendent, that all other ſupply ſeems ſcarcely neceſſary; and accordingly we find, that Venus receives no other, excepting what our earth reflects upon her, from her full orb, in nightly and majeſtic ſplendor.

Arrived at our earth, the ſcene begins to vary conſiderably; the ſun, which hitherto has ſhewn a moſt extenſive circle, and been dazzlingly bright beyond our feeble conception, is diminiſhed both in ſize and brightneſs; yet not ſo diminiſhed, but that his beams are, as we very well know, ſtill exquiſitely vivid, and nutritiouſly ſalutary; but, on the other hand, to us a ſcene of nocturnal beauty is opened, to which Venus and Mercury are entire ſtrangers. The ſilver moon, and the ſparkling ſtars, adorn the robe of night with a delicate and ſerene luſtre, which, perhaps, almoſt compenſates for that greater profuſion of the ſun's ſplendor, which his nearer neighbours evidently enjoy. As we are more ſenſibly acquainted with our earth, let us reſt a moment longer, and take a cloſer view of the ſcene of things. We may now look both backwards upon the ſcenes we have paſſed, and forwards upon thoſe ſtill to come; and, I think, be confirmed in the opinion, which I have endeavoured to eſtabliſh, by the proſpect both ways. We ſeem to be placed here as it were in an iſthmus, between both thoſe ſeas of brightneſs, the Sun and the Fixed Stars; and an advance either way, enlarges the view of the one, and leſſens that of the other: but at reſt where we are, we are entertained with a grateful and beautiful ſcene of the ſun and ſtars, which the hand of nature has ſpread before us in a degree of moderation, ſuited doubtleſs to our capacities, and yet ſufficient to raiſe our thoughts in adoration of the gracious hand of the creator.

But let us proceed on our aerial journey to Mars, where the order of the ſcene begins to be inverted, and night gains that brightneſs which the leſs enlightned day is deprived of; for as the ſize and luſtre of the ſun is diminiſhed, that of the fixed ſtars is evidently enlarged. Mars ſeems to be placed in ſo equal a ſituation, as to receive nearly a like ſhare of luſtre from the ſun and ſtars, yet from neither ſufficient (at leaſt to our conception) to render him ſo pleaſing a habitation as our earth, or, indeed, any of the other planets. There yet may be ſomething peculiar in the nature and conſtruction either of himſelf or atmoſphere, that may give advantages which we know not of. This is evident, that his fiery colour beſpeaks him different from every other planet; and it is no unreaſonable conjecture, that this viſible difference is occaſioned by ſomething, which compenſates, in eſſential ſervice, for the comparative diſadvantage of his ſituation.

Let us now tranſport ourſelves to Jupiter, and obſerve the increaſing beauties of the ſcene. The ſtars enlarge every moment, as well in luſtre as in ſize, upon the delighted eye, *making night lovely*; in fact, more lovely than the dim day, over which the leſſened ſun ſheds but faint and feeble beams; beams ſufficient, indeed, to give him a kind of paly crepuſcular light, which we ſee reflected back to us from the body of the planet; and it is ſuch a light as, when compared with the ſparkling luſtre of Venus, ſpeaks plainer than a thouſand arguments the leſſened force and influence of the ſun at ſo remote a diſtance: but if we turn our eyes to the other ſide of the planet; which is towards the fixed ſtars, we ſhall perceive a ſcene of auguſt and exquiſite ſplendor: ten thouſand times ten thouſand living lamps (words fail me) ſhed their kindly influence both of light and heat upon the happy habitation; and, as if this were not ſufficient, the indulgent hand of heaven has beſtowed four moons upon this highly-favoured world, which receive and reflect upon it, in their unceaſing viciſſitudes, thoſe ſtreams of light which are inceſſantly ſhed from the glorious fountains all around them.

Arrived now at Saturn, the remoteſt of the planetary worlds, the perſpective is reverſed, the ſun beheld at an immenſe diſtance, and by that diſtance deprived, in a very great meaſure, of light and heat, and nearly contracted into a ſtar. A ſcene of melancholy and wretchedneſs, which philoſophy indeed has provided for this forlorn region, but the bountiful hand of nature has not dealt ſo ſeverely by it; ſo far from that, an apparatus of infinitely greater grandeur than any other planet can boaſt of, diſtinguiſhes this. For if our eyes can bear ſuch a flood of light, *now* let us look on the fixed ſtars, and ſee what a change in their appearance this nearer approach has made. If the boldeſt flights of poetical fancy are juſtified by the contemplation of the ſtarry heavens, when ſeen from this earth, what ſhall we ſay, when the exalted and animating proſpect is ſeen from Saturn? What *here* is rapture, excited by imagination, muſt *there* be reaſon, founded on certainty; and that mind muſt be ſtrangely cold (I will not *now* ſay of a Saturnian caſt) that does not eagerly adopt the ſweet effuſions of the *Poet of Night*,

Oh what a conflux of ethereal fires,
From urns unnumber'd, down the ſteep of heav'n,
Stream to the eye! oh, who can ſatiate ſight
In ſuch a ſcene? in ſuch an ocean wide
Of deep aſtoniſhment; and where to count
The thick-ſown glories in this field of fire,
Perhaps a Seraph's contemplation fails.

And let us not forget the additional aid to receive and reflect this torrent of ſplendor which the creator has beſtowed on Saturn—his extenſive ring and five moons; his ring, of which we ſhall now no more complain, for daily intercepting the ſun's twinkling light, ſince it borrows and returns from millions and millions of glowing ſtars, infinitely more than it robs the planet of by his frequently eclipſing the diſtant ſun; and, in regard to the five moons of Saturn, I preſume, it is at this time needleſs to obſerve how they anſwer the ſame delightful and ſalutary end in a degree proportioned to their ſize and number.

I have further to obſerve upon theſe two ſuperior planets, Jupiter and Saturn, that, if my conjecture be well founded, the time which has hitherto been reckoned their day, is, in fact, their night: I mean, that in that hemiſphere of the planet which we ſee, and which is turned towards the ſun, it is night; while, on the oppoſite ſide, which courts and enjoys the influence of the fixed ſtars, it is refulgent day; and, by conſequence, theſe all enlightened worlds are only ſenſible of a diminution of light, but never know what total darkneſs is.

Ee'r we take our leave of theſe worlds, ſo beautifully enlightened and nouriſhed, and ſo happily arranged in the exacteſt order, it may be no unpleaſing ſpeculation to remark, what a peculiar reſemblance there is between the ſituations, and conſequently the enjoyments, of Saturn and Mercury, of Jupiter and Venus, of the Earth and Mars. The reader, if he approves my conjecture, will, in an inſtant, ſee, that in regard to Saturn and Mercury, what the ſun is to one, the ſtars are to the other; and ſo proceeding, in an exact and wonderful order, till we meet at Mars and the Earth, we ſhall find the ſame analogy between each reſpective pair of the planets thus remarkably harmonized.

What a beautiful variety of ſplendid glories muſt the ſuperior planets paſs through in their revolutions, one of twelve, and the other of thirty, years round the ſun! To us the ſtarry heavens exhibit a much livelier ſcene of ſparkling luſtre at ſome ſeaſons than at others; what then muſt they ſhew to thoſe nearer regions of Jupiter and Saturn? When in their courſes theſe planets advance towards, or retreat from, the brighter conſtellations of the zodiac; what a delightful change of encreaſing and decreaſing ſplendor muſt they experience! Taurus, for inſtance, muſt exhibit a ſpectacle of aſtoniſhing luſtre; and the cluſter of ſtars in his neck, in which our teleſcopes diſcover to us upwards of ſeventy, muſt, to thoſe worlds, be greatly increaſed in number, and conſequently ſhed a ſtrong blaze of brightneſs upon the globe, that rolls beneath; while, at the ſame time, ſouthward, the ſparkling diſc of Sirius muſt ſhine with accumulated rays; and near him, what a dazzling ſplendor muſt be that of the conſtellation of Orion, in which our glaſſes diſcover two thouſand ſtars; on Jupiter and Saturn doubtleſs ten thouſand times ten thouſand, from the ſame conſtellation, pour their united influence; and, in regard to the milky way, what a ſcene of refulgence will that exhibit! How raviſhing muſt be the advance to ſuch ſplendid ſcenes, where the glory brightens, and ſtill brightens, every moment, till it beams around in a manner that nothing in our earth can give us any idea of. The poetical fiction of Elyſium muſt here be realized, where

Purer æther, and more glowing ſky,
Inveſt the ſcene, and charm the raviſh'd eye;
Unlike the feeble light on earth below,
Stars of their own, unnumber'd ſuns, they know.

I have one obſervation more to offer upon this head, which is, the excellence of the contrivance in regard to the fixed ſtars. As ſuns, according to the old opinion, they were of little uſe but to their reſpective ſyſtems, but now they appear beautifully to anſwer the double end of illuminating not only their own planets, but alſo thoſe of a neighbouring ſyſtem, which are moſt remote from their central ſun. An end, which probably every ſingle ſtar cannot (there is one which we know cannot) anſwer to their moſt diſtant planets; and yet an end, which all the ſtars united conſpire, in a wonderful manner, to anſwer towards every planet which ſtands in need of it throughout the univerſe. *Great and marvellous are thy works, O Lord God Almighty, juſt and true are thy ways, O King of Saints!*

SECTION III.

In which certain objections to the probability of the conjecture are conſidered.

I AM not ſo ſanguine in my opinion, as to imagine no objections can be made to it, nor do I confidently obtrude it upon the public as unanſwerable; on the contrary, I offer it, with all deference, to ſuperior judgments; and wiſh it, as it is propoſed with modeſty, to be conſidered with candour. This, however, I may venture to be confident of, that the thought does greater honour to the hand of God, *who in wiſdom has created all* worlds, than the commonly-received opinion, which I cannot but conſider as mean and degrading; and I ſhould hope, that this reflection might plead my excuſe, if, in the courſe of theſe ſheets, I may have treated that opinion with an appearance of auſterity; for I am ready to imagine, that when the unbounded wiſdom of God, and the ſhort-ſighted contrivance of Man, come in competition, it will not be deemed a culpable ſeverity to ſtile the latter *fooliſhneſs*.

But though I wiſh not to be, as Mr. Grey elegantly expreſſes it, either *obvious or obtruſive*, yet I pretend not ſo far to diveſt myſelf of the natural predilection of an author, as not to be deſirous of removing every obſtacle which might hinder the rational eſtabliſhment of my conjecture. As to petulant cavils, I ſhall take no notice of them; but ſuch objections as may hereafter be offered in a ſpirit of candour and moderation, I will endeavour, in the ſame ſpirit, to anſwer; if they bring conviction with them, I will ſubmit, and not carry on the conteſt after the field is loſt. At preſent no objections occur, but ſuch as, I flatter myſelf, are not well grounded, and therefore may be fairly overturned. Theſe, however, I ſhall proceed to propoſe, and to anſwer.

The novelty of the thought may be objected, as it may be ſaid, that the philoſophical world has been ſatisfied with the received opinion which time and authority have eſtabliſhed, why then ſhould any new one be propoſed? I anſwer, becauſe the old one, upon cloſe conſideration, (unconſidered, indeed, it might paſs upon the ſtrength of the philoſophical *ipſe dixit*, as, I confeſs, it did with me) appears totally weak and unſatisfactory; if, therefore, a new opinion is offered, which is raiſed upon a better foundation, why ſhould it not be received, and the juſtice of it acknowledged? I know, indeed, that, with men of impartial minds, this objection will never be made at all; for if novelty be made an objection; there is then an end of all improvement for ever; but I know too, that there are who look upon opinions, which have received the ſtamp of time, without conſidering whether the ſanction of truth be added to them, as ſacred and inviolate: it is to theſe men I would apply; and wiſh them firſt to diveſt themſelves of ſo weak a prejudice, and then they may conſider what I have offered with minds open to fair conviction.

It will perhaps be ſaid, (for it has been ſaid, and, indeed, I have taken ſhort notice of it before) that the ſuperior planets may be formed of materials, which require no greater degree of heat than they receive from the ſun; and may be peopled with inhabitants, whoſe conſtitutions are ſuited to the cold and darkneſs of the place: perhaps ſo; I am ſure I will not ſay to the contrary; but this I will ſay, that it can only be ſuppoſed: yet, if there be any ſtrength in the argument from analogy (which will have great weight with judgments ſwayed by reaſon) the ſuppoſition muſt be moſt abſurd. Regions of ice and iron, with inhabitants of marble texture! What a thought! How contrary to every principle of ſenſe and reaſon! That ſuch regions ſhould vegetate and flouriſh, that ſuch inhabitants ſhould live and enjoy life! Theſe are the miſerable ſhifts to which philoſophers are driven, who will defend, merely becauſe they have entertained, a ſuppoſition however fantaſtic or ridiculous. I could not but ſmile at a philoſopher of this ſtamp, who, with all the gravity in the world, defends the opinion, that the inhabitants of Saturn are ſuited to the coldneſs of the region, by ſaying, that "he put inſects "into a freezing mixture of nitre and "ſnow, which is intenſely cold, and they "ſeemed not affected with it; and that "he has froze them in a cylinder of ice "for half an hour, and it did not kill "them." It might not; but would it not kill men and women? And to ſay that the inhabitants of Saturn are formed with conſtitutions of this cold-enduring nature, is ſaying nothing; or, what is much the ſame thing, it is arguing from things of which we can have no conception, and deſerting the firm ground of reaſon, to wander on the airy and unſubſtantial regions of fancy. If an opinion is offered, which will ſhew that Jupiter and Saturn are enlightened and nouriſhed in a remarkable and eminent manner, and, by conſequence, that the happy inhabitants may be beings of which we may form ſome idea; how much more natural is ſuch an opinion, than a frigid notion, which affords them a dim dead light without heat, and obliges us to create an imaginary ſpecies of inanimate miſerables, who have a kind of negative ſenſe and feeling,, ſuited to the wretched region?

But there is ſtill behind another and more formidable objection, which, if admitted, will overturn all that I have offered, and annihilate my conjecture for ever. It is this: "That ſuch is the immenſe "diſtance of the fixed ſtars, that the "neareſt approach towards them, within "the compaſs of our planetary ſyſtem, "and indeed much beyond it, would make "no difference in their ſize and luſtre." "If this, indeed, be true, I muſt give up the point entirely, and, I fear, leave the ſuperior planets in the ſame forlorn and deſolate condition in which I found them, and in which ſevere philoſophy is ſo fond to place them. But, before I offer a direct anſwer to this objection, I cannot but obſerve, that there ſeems to appear in it a ſtrong affectation (as *Bays* has it) to *elevate and ſurpriſe*. Philoſophers, not contented with that noble ſcene of power and magnificence which a rational view of the works of nature will afford us, affect to magnify appearances beyond all reaſonable extent, in order to raiſe our wonder, not merely at the ſcene of Nature, but at their own abilities, which could frame ſuch great calculations; ſurely, however, ſuch wonder muſt be offered with a *fooliſh face of praiſe*, when it is made to appear, that this account, under a ſemblance of exalting the works of nature, only drives them headlong into abſurdities,

For

For let it be conſidered: What is it that hinders us from ſeeing many of the fixed ſtars? I anſwer, diſtance. But it may be ſaid, that the groſs medium of the atmoſphere hinders us from ſeeing them: I grant it; but when another queſtion is aſked, viz. what is it diminiſhes the ſize of thoſe we do ſee? Let it then be ſeen what will be the effect of this groſs medium; for the anſwer muſt be *diſtance*, and nothing elſe; as the atmoſphere (ſo far from leſſening) will magnify, according to a known law of viſion, that "objects appear larger through a groſſer "medium." Diſtance, therefore, being ing thus eſtabliſhed as the only thing to be conſidered, let me further aſk, what occaſions their unequal magnitudes, but their unequal diſtances? Does diſtance then make all this change, and nearneſs none? Surely, this is a diſtinction without a difference; for, indeed, I ſee not how the idea of unequal diſtances, and that of nearneſs, can be ſeparated; and nearneſs muſt be allowed to make an eſſential difference in viſible objects, whoſe various magnitudes are confeſſedly granted to ariſe from their various diſtances. If certain fixed ſtars, which are inviſible to the naked eye, appear by the help of a good teleſcope, and ſtill more as the glaſs is better; does it not follow, that a nearer approach would anſwer the end of one teleſcope, and a ſtill nearer, that of the improved glaſs? If then this be allowed, every advance higher would certainly enlarge and amplify to the naked eye, till we arrive at that profuſion of ſplendor which I have, however faintly, attempted to deſcribe.

But, to examine this matter more fully, and underſtand it more clearly, let us look upon it in the following light, which I flatter myſelf is a juſt and true light. As we ſtand and view the heavens, we behold a certain number of ſtars; we take a teleſcope, and, on applying it to the eye, perceive a great many others. Theſe laſt are inviſible to the unaſſiſted eye, but, by the aid of a teleſcope, become conſpicuous. Now, the teleſcope anſwers the end of a nearer approach. There muſt, therefore, be a certain point of view, which we will call the teleſcopic point, to which, if we were advanced, we ſhould ſee theſe ſtars with the naked eye, which here the aſſiſtance of the glaſs can only give us. The power of the glaſs, therefore, muſt be the ſame as this point, which is given us entirely by the leſſened diſtance, ſuppoſe of one, two, or ten miles, from the ſtars which were before inviſible to us. Now, if a nearer advance preſent us with a ſight of them at all, a ſtill nearer muſt enlarge them to our view, as well as a retreat muſt deprive us of them again. And what does all this prove, but what the experience of a child will tell him, that diſtance diminiſhes objects, which as, it increaſes, deprives us of the ſight of them, and that a nearer approach gives a firſt view, which a ſtill nearer enlarges upon the eye: a truth too common for ſtern philoſophy to admit of, which will only allow the former, but not admit the latter part of it.

But if, after all, in defiance of reaſon and ſenſe, and to comply with this inflexible philoſophy, I ſhould give up the point, and allow, that a nearer approach towards the fixed ſtars would not enlarge their ſize, I apprehend, that ſtill my conjecture would ſtand upon grounds ſufficiently firm to ſupport it; for if ſuch an approach will not magnify, experience ſhews that it will *multiply*, and in ſuch abundance, as will anſwer the ends I propoſed by it. For if we mark the effects of a good teleſcope, and of a better, and of another ſtill more improved, (which is exactly the ſame thing as if we advanced nearer to the ſtars ourſelves) we ſhall find the number of them increaſe, and ſtill increaſe, till they multiply in ſeemingly countleſs profuſion. And if this be the effect as far as our glaſſes will reach, what would be the conſequence, if we ourſelves were advanced to the planet Mars? Let reaſon judge, and ſay what millions beyond millions muſt there be multiplied (I will keep clear of the word *magnified)* upon the ſight, and what an increaſe of light they muſt afford. But, aſcending on to Jupiter and Saturn, the multiplication will be ſuch, that deficient number, though extended to the utmoſt, muſt fail us, and thought itſelf be ſcarcely able to keep pace with the grand increaſe of theſe objects of ſplendor; indeed, I apprehend we ſhould ſoon find Pope's exaggerated, though beautiful, deſcription of the ſtarry heavens, *A flood of glory burſts from all the ſkies,*

ſoon realized, in our progreſs, beyond deſcription, almoſt beyond conception.

Objections thus, I hope removed, I may preſume that my conjecture reſts upon the ſolid grounds of truth and reaſon. It remains with the defenders of the old opinion, if they will reject that which I have here offered, to ſhew how the ſuperior planets are nouriſhed by the genial comforts of light and heat; for neither unprejudiced reaſon, or juſt analogy, can induce us any more to entertain a ſuppoſition, that the ſun is their only ſource from whence they derive thoſe eſſential bleſſings. I cannot, however, conclude the whole without declaring, that whatever may be the fate of this opinion, which I here venture into the world, and anxiouſly, though not unwillingly, ſubmit to the judicious and candid eye, ſtill I ſhall

I ſhall always have the ſecret ſatisfaction, of having endeavoured to explain the works of the Almighty, by a thought which fills the mind with rapturous aſtoniſhment, and tends to elevate it in praiſe and adoration. To the honour of God that thought is ſacred, which attempts to ſhew how greatly and how graciouſly his all-powerful hand has provided for the ſupport and happineſs of the planetary worlds——

——We cannot go
Where univerſal love ſmiles not around,
Suſtaining all yon orbs, and all their ſons:
From unſuſpected cauſes pouring good,
And better thence again, and better ſtill,
In infinite progreſſion.——But I loſe
Myſelf in him, in light ineffable!
Come then, expreſſive ſilence, muſe his praiſe.

FINIS.